UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/855,292	05/14/2001	William W. Macy JR.	10559-398001/P10335	1919

7590 09/15/2004

Joni D Stutman Horn
Blakely Sokoloff Taylor & Zafman LLP
12400 Wilshire Boulevard Seventh Floor
Los Angeles, CA 90025

EXAMINER	
ROSARIO-VASQUEZ, DENNIS	
ART UNIT	**PAPER NUMBER**
2621	

DATE MAILED: 09/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/855,292	MACY, WILLIAM W.	
	Examiner	Art Unit	
	Dennis Rosario-Vasquez	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment received on June 22, 2004 has been entered and made of record. Currently, claims 1-30 are pending.

Response to Arguments

2. Applicant's arguments filed June 22, 2004 in the amendment with regard to claims 1,5 and 6 on pages 8 and 9 have been fully considered but they are not persuasive.

The amendment states on page 8 for claims 1 and 5, "At no time does Wong teach a device which detects an edge in a smoothed image."

However Wong does teach a device (Fig. 2, num. 20:STATISTICAL SMOOTHING) that detect an edge (The statistical smoothing uses a neighborhood of pixels to determine an edge based on a variance measure $v_{m,n}$ as mentioned in col. 5, lines 23-29 and col. 6, lines 12-17.) in a smoothed image (Fig. 3, num. 24 contains a statistical smoothing operation that receives a smoothed image from another statistical smoothing operation in fig. 3, num. 22).

The amendment states on page 9, "Moreover, at no time does Wong teach or suggest applying an edge filter to an already smoothed image, as specifically recited in Claim 6." This has been addressed above for claims 1 and 5.

3. Applicant's arguments filed June 22,2004 in the amendment with regard to claim 9, lines 10 and 11 have been fully considered but they are not persuasive.

Wong discloses generating an enhanced image (Fig. 3:GRAY SCALE IMAGE. Wong states, "In a preferred embodiment, errors generated during either a halftoning process or an inverse half-toning process are removed and a high quality gray scale image is constructed by using a pipeline of stages, with each stage having both low pass filtering and non-linear statistical smoothing (col. 3 lines 2-7).") comprised of the edge areas (fig. 3, num. 24:"T(.)" detects an edge using a "window" in numeral 20:STATISTICAL SMOOTHING of fig. 2 which is implemented in fig. 3, num. 24 as mentioned in col. 6, lines 12-17.) of the smoothed image (The output of fig. 3, num. 22 is a smoothed image. Note that fig. 3, num. 22:"T(.) contains a smoothing operation shown in fig. 2, num. 20) and lowpass-filtered non-edge areas (Fig. 3, numerals 24 and 26 filters or "removes" only unwanted high frequency components as mentioned in col. 5, lines 13-16 and col. 6, lines 35-37.) of the smoothed image (The output of fig. 22 is a smoothed image.).

4. Applicant's arguments filed June 22, 2004 in the amendment with regard to claim 4 have been fully considered but they are not persuasive.

Claim 4 has been addressed above for claims 1, 5 and 6.

Applicant's arguments, see amendment page 10, filed June 22, 2004, with respect to the rejection(s)of claim 3 under Fan (US Patent 5,027,078 A) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Wong.

5. Applicant's arguments filed June 22, 2004 in the amendment with regard to claim 7 on page 10 have been fully considered but they are not persuasive.

The amendment states on page 10, "Further, none of the cited references teach or suggest that a smoothed and filtered image can be further enhanced by applying a median filter, as recited in claim 7." This has been addressed in claim 7.

Additionally, based on Appendix A, the median filter takes an average between two values if there is an even amount of numbers, and Wong has a window of pixels that are averaged between pixel values. Thus, the averaged pixels from the window of Wong are the same as the averaging performed for the median filter of Appendix A.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1,2,3,5,6,7,8,9,10,31 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Wong (U.S. Patent 5,506,699 A).

Regarding claim 1, Wong discloses a method of enhancing an image, comprising:

a) smoothing (fig. 3, num. 22: "T(.)" has a smoothing operation shown in fig. 2. num. 20:STATISTICAL SMOOTHING.) the image (fig. 3: BINARY IMAGE is a halftone image "$b_{m,n}$" generated from the circuit of fig. 1 as mentioned in col. 4, line 51 and col. 5, lines 4-6.) to produce a smoothed image (The output of fig. 22 is a smoothed image.);

b) performing low pass filtering (Fig. 3, numerals 24 and 26 have a lowpass filter. Note that fig. 3, num. 24 contains a detailed view shown in fig. 2 that has a lowpass filter 18.) on the smoothed image (The output of fig. 3, num. 22 is a smoothed image.) to produce an enhanced image (fig. 3, label: "GRAY SCALE IMAGED." Wong states, "In a preferred embodiment, errors generated during either a halftoning process or an inverse half-toning process are removed and a high quality gray scale image is constructed by using a pipeline of stages, with each stage having both low pass filtering and non-linear statistical smoothing (col. 3 lines 2-7)."); and

c) detecting an edge (fig. 3, num. 24:"T(.)" detects an edge using a "window" in numeral 20:STATISTICAL SMOOTHING of fig. 2 which is implemented in fig. 3, num. 24 as mentioned in col. 6, lines 12-17.) in the smoothed image (The output of fig. 3, num. 22 is a smoothed image. Note that fig. 3, num. 22:"T(.) contains a smoothing operation shown in fig. 2, num. 20).

Regarding claim 2, Wong discloses the method of claim 1, wherein smoothing comprises:

a) applying a two-dimensional filter to a pixel in the image (A 3 by 3 window with a central pixel is used at col. 5, lines 25-27 and col. 6, lines 27,28);

b) storing a pixel (Wong states," The superscripts "old" and "new" refer to the value of the center pixel before and after, respectively, each statistical smoothing process along the pipeline of FIG. 3 (col. 5, lines 45-47)."). Therefore old values of the central pixel are used to compute new central pixels mentioned in col. 5 lines 38-44) processed by the two-dimensional filter (The 3 by 3 window is used by the "statistical smoothing process" to compute the center pixel.) in the smoothed image (The output of fig. 3, num. 22 is a smoothed image. Note that fig. 3, num. 22:"T(.) contains a smoothing operation shown in fig. 2, num. 20); and

c) repeating storing and applying for one or more other pixels in the image. Wong states," The operation is repeated on a pixel-by-pixel basis over the entire image, wherein the window that defines neighborhood "slides" across the image (col. 5 lines 47-50)."

Regarding claim 3, Wong discloses the method of claim 1, wherein performing lowpass filtering (Fig. 3, numerals 24 and 26 have a lowpass filter. Note that fig. 3, num. 24 contains a detailed view shown in fig. 2 that has a lowpass filter 18.) comprises:

a) applying a one-dimensional filter (Fig. 3, num. 24 contains a filter shown in fig. 2, num. 18:LOW PASS FILTER which is a linear filter as mentioned in col. 3, line 11. A linear filter filters values based on a dimension of frequency as mentioned in col. 5, lines 18-22.) to a pixel (Fig. 3, num. 24 contains a filter shown in fig. 2, num. 18 that inputs a pixel for processing to a statistical smoothing operation 20 as mentioned in col. 5, lines 44-46.) in the smoothed image (The output of fig. 3, num. 22 outputs a smoothed image using fig. 2, num. 20. Note that fig. 2 is a detail of fig.3, num. 22.);

b) storing (Fig. 3, num. 28: is a compression process in col. 6, line 41.) a pixel (An image of pixels) processed by the one-dimensional filter (Fig. 3, num. 24 contains a filter shown in fig. 2, num. 18) in the enhanced image (fig. 3, label: "GRAY SCALE IMAGED."); and

c) repeating ("The operation is repeated" in col. 5, lines 46,47.) storing (Fig. 3, num. 28: is a compression process) and applying for (Fig. 3, num. 24 contains a filter shown in fig. 2, num. 18) one or more other pixels (Wong states, "The operation is repeated on a pixel-by-pixel basis over the entire image...(col. 5,lines 46-49)." Note that "The operation" is referring to a statistical smoothing operation of fig. 2, num. 20 that receives a pixel from a low pass filter 18 and outputs a single pixel. Since the statistical smoothing operation receives a pixel for processing, the low pass filter 18 is generating a pixel for the above smoothing operation.) in the smoothed image (The output of fig. 3,

num. 22 outputs a smoothed image using fig. 2, num. 20. Note that fig. 2 is a detail of fig.3, num. 22.)

Regarding claim 5, Wong discloses the method of claim 1, wherein lowpass filtering (fig. 3, numerals 24 and 26. Note that fig. 3, num. 24 contains a detailed view shown in fig. 2 that has a lowpass filter 18.) is performed only on non-edge areas (Fig. 3, numerals 24 and 26 filters or "removes" only unwanted high frequency components as mentioned in col. 5, lines 13-16 and col. 6, lines 35-37.) of the smoothed image (The output of fig. 22 is a smoothed image.).

Regarding claim 6, Wong discloses the method of claim 5, wherein detecting the edge (fig. 3, num. 24:"T(.)" detects an edge using a "window" used in numeral 20:STATISTICAL SMOOTHING of fig. 2 which is implemented in fig. 3, num. 24 as mentioned in col. 6, lines 12-17.) comprises applying an edge filter (Fig. 2. num. 20:STATISTICAL SMOOTHING) to the smoothed image (The output of fig. 3, num. 22 is a smoothed image.).

Regarding claim 7, Wong does teach a method of enhancing an image, comprising:

a) smoothing (fig. 3, num. 22: "T(.)" has a smoothing operation shown in fig. 2. num. 20:STATISTICAL SMOOTHING.) the image (fig. 3: BINARY IMAGE) to produce a smoothed image (The output of fig. 22 is a smoothed image. Note that fig. 3, num. 22:"T(.) contains a smoothing operation shown in fig. 2, num. 20);

b) performing low pass filtering (Fig. 3, numerals 22 has a lowpass filter. Note that fig. 3, num. 22 contains a detailed view shown in fig. 2 that has a lowpass filter 18.) on the smoothed image (The output of fig. 3, num. 22 is a smoothed image. Note that fig. 3, num. 22 contains a detailed view shown in fig. 2 that has a lowpass filter 18) to produce an enhanced image (The output of fig. 3, num. 22 is an image with removed unwanted frequency components as mentioned in col. 5, lines 13-16.); and

c) applying a median filter (Fig. 3, num. 24 has a median filter shown in fig. 2, num. 20. Note that fig. 3, num. 24 contains a detailed view shown in fig. 2 that has a median filter 20:STATISTICAL SMOOTHING. According to the specification at page 8, lines 19-21: "The median filter may also be an NXN filter, which is applied in the manner described above...". Thus, the statistical smoothing of fig. 3, num. 24 uses a 3 by 3 window where a center pixel or median pixel value is "adjusted" based on "its neighbors" as mentioned in col. 6, lines 1-3. Note that the center pixel is in the middle of a 3 by 3 window distribution of other pixels to compute a new middle or median value for the center pixel.), to the enhanced image (The output of fig. 3, num. 22 is an image with removed unwanted frequency components as mentioned in col. 5, lines 13-16.), wherein the median filter (Fig. 3, num. 24 has a median filter shown in fig. 2, num. 20.) is designed to reduce artifacts on the enhanced image (The filter of fig. 3, num. 24 which has a median filter shown in figure 2, num. 20 is designed to provide a gray scale image with overly blurring the image...(col. 6, lines 17-20).")

Claim 8 has been addressed in claim 5 above.

Claim 9 has been addressed in claims 1 and 5 except for the limitation of

d) generating an enhanced image (Fig. 3:GRAY SCALE IMAGE. Wong states, "In a preferred embodiment, errors generated during either a halftoning process or an inverse half-toning process are removed and a high quality gray scale image is constructed by using a pipeline of stages, with each stage having both low pass filtering and non-linear statistical smoothing (col. 3 lines 2-7).") comprised of the edge areas (fig. 3, num. 24:"T(.)" detects an edge using a "window" in numeral 20:STATISTICAL SMOOTHING of fig. 2 which is implemented in fig. 3, num. 24 as mentioned in col. 6, lines 12-17.) of the smoothed image (The output of fig. 3, num. 22 is a smoothed image. Note that fig. 3, num. 22:"T(.) contains a smoothing operation shown in fig. 2, num. 20) and lowpass-filtered non-edge areas (Fig. 3, numerals 24 and 26 filters or "removes" only unwanted high frequency components as mentioned in col. 5, lines 13-16 and col. 6, lines 35-37.) of the smoothed image (The output of fig. 22 is a smoothed image.).

Claim 10 has been addressed in claims 7 and 8 above.

Claim 31 has been addressed in claim 1.

Claim 32 has been addressed in claims 5 and 6.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,506,699 A) and in view of Seidner et al. (US Patent 5,333,064 A).

Regarding claim 4, Wong teaches the use of a cut-off frequency for the lowpass filtering (Fig. 3, numerals 24 and 26 have a lowpass filter. Note that fig. 3, num. 24 contains a detailed view shown in fig. 2 that has a lowpass filter 18 at col. 5 lines 19-23.)

Wong does not teach a lowpass filter having a sharp high-frequency cut-off.

However, Seidner et al. does teach, in the filed of endeavor of desrceening or inverse halftoning, a Hamming filter that can be used for screen removal at col. 3 lines 58-62. According to the instant application a Hamming filter includes a sharp cut-off frequency.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the low-pass filter of Wong with the teaching of Seidner et al.'s Hamming filter because the Hamming filter can perform calculations "on-the-fly" at col. 3,lines 54-57. Therefore the filter calculations can continue without stopping the calculation process in order to change a filter parameter at col. 3, lines 56-58.

Claim 14 has been addressed in claim 4.

10. Claims 11-13,15-23 and 25-30,33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,506,699 A) and in view of Fan (US Patent 5,027,078 A.

Regarding claims 11-13 and 15-18, which are similar to claims 1-3 and 5-8, respectively, except for requiring an article comprising a machine-readable medium that stores machine-executable instructions for enhancing an image.

Wong does not teach the article as required by claims 11-13 and 15-18, but teaches an algorithm that can be used with inverse halftoning as prior art at col. 1 , lines 60-67.

However, Fan does teach the use of an algorithm for unscreening or inverse halftoning at col. 2, lines 54,55.

Claims 19 and 20 have been addressed in claims 9 and 10 above except for requiring the article which was addressed in claims 11-13 and 15-18 above.

Claim 21 was addressed in claim 1 above except for requiring an apparatus (Wong, fig. 3 suggests an apparatus).

However, Fan does teach

a) a memory that stores executable instructions (Fig. 3A is an algorithm that uses a memory 210.), and

b) a processor that executes the instructions (Fan, figure 1 shows major processing blocks that would inherently be used by a processor at Fan, col. 2,line 54.).

Claims 22,23, 25,26 have been addressed in claims 2,3,4,5 and 6 above, respectively.

Claim 27 has been addressed in claims 7 and 21.

Claim 28 has been addressed in claim 8.

Regarding claim 29, Wong discloses an apparatus (Fig. 3) and the additional elements were addressed in claims 9 and 2.

Claim 30 was addressed in claim 10.

Claim 33 was addressed in claim 1.

Claim 34 was addressed in claims 5 and 6.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to use the algorithm of Fan to modify Wong's invention with the teaching of an inverse halftoning algorithm in the prior art, because 'la flexible unscreening algorithm capable of incorporating additional functionality so as to enable customization of the unscreening process according to the output elects desired, for example, modification of the tonal reproduction curve (TRC) used to produce the continuous tone output image (Fan, col. 2 lines 6-12)."

11. Claims 14 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,506,699 A) and in view of Fan (US Patent 5,027,078 A) as applied to claims 11 and 21 above, and further in view of Seidner et al. (US Patent 5,333,064 A).

Claims 14 and 24 have been addressed in claim 4 above.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario-Vasquez whose telephone number is 703-305-5431. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on 703-305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DRV
Dennis Rosario-Vasquez
Unit 2621

LEO BOUDREAU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600